TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
0000055133		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2004/013809	04.12.2004	09.12.2003

International Patent Classification (IPC) or national classification and IPC

B01J23/72, B01J37/00, C07D307/08, C07D315/00, C07C29/136

Applicant

BASF Aktiengesellschaft

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:

      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))

      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/013809

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-14 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. _____ as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* 1-9 received by this Authority on 17.08.2005 with letter of 15.08.2005

nos.* _____ received by this Authority on _____

☐ the drawings:

sheets _____ as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/013809

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-9	YES
	Claims		NO
Inventive step (IS)	Claims	1-9	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. Reference is made to the following documents:

D1: EP-A-1 228 803
D2: US-A-4,423,155
D3: DE-A-2 332 906
D4: WO-A-97/34694
D5: US-A-4,666,879

2. The present application meets the requirements of PCT Article 33(1).

2.1 Document D1 discloses (see claims 1-10) a core/shell moulded catalyst body that can be produced by coextrusion of an aqueous moulding compound that contains the base material or a precursor thereof and of a aqueous moulding compound that contains the catalytically active material or a precursor thereof, followed by drying and calcining of the coexdrudate. A precipitated CuO/Al2O3 powder with 50 wt.% CuO is used, for example, as catalytic material and aluminium hydroxide hydrate is used as binding agent (see example 1). The moulded catalyst body

produced in example 1 has more than 5 wt.% copper oxide and aluminium oxide in the active material and as binding agent.

The subject matter of independent claim 1 thus differs from D1 in that the moulded catalyst body has a macroscopically uniform structure. D1 does not disclose the claimed pore volume or the distribution of the oxidic base material.

The subject matter of claims 1-9 is thus novel with respect to D1 (PCT Article 33(2)).

2.2 Document D2 (see column 3, line 60 - column 4, line 43) describes a catalyst for producing dimethyl ether, consisting of a mixture of a coprecipitated Cu/Zn/Al catalyst and a gamma-aluminium oxide (see examples 1 and 3-6); the gamma-aluminium oxide is considered a "binding agent", i.e. is suitable thereas. DME is produced by hydrogenating CO ("carbonyl compound").

D2 does not explicitly disclose a pore volume of more than 0.15 ml/g in the pore diameter range of 10 to 100 nm.

The subject matter of claims 1-9 is thus novel (PCT Article 33(2)).

2.3 Document D3 (see claims 1-3) discloses a method for producing tetrahydrofuran by the catalytic (gas phase) hydrogenation and dehydration of

maleic acid anhydride in the presence of a catalyst consisting of a mixture of a silicic acid aluminium oxide catalyst and a copper-chromium-zinc catalyst. If mixing is carried out using a binding agent (chromium gel solution), the physical strength of the finished catalyst increases considerably. In example 1, 100 g of copper-chromium-zinc catalyst, 100 g of silicic acid aluminium oxide mixture and 44 g of chromium gel solution as binding agent is kneaded together and shaped into pills with a diameter of 1 mm with the aid of a pill machine.

The shaped catalyst contains chromium oxide in the active material and as binding agent.

Document D3 does not disclose a pore volume of more than 0.15 ml/g in the pore diameter range of 10 to 100 nm.

The subject matter of claims 1-9 is thus novel (PCT Article 33(2)).

2.4 Document D4, which is considered the prior art closest to the subject matter of claims 1-9, discloses a chromium-free, copper-containing hydrogenating catalyst, the method for the production thereof and the use of said catalyst, *inter alia*, for hydrogenating aldehydes and ketones.

D4 (see page 8, lines 1-8; claim 25) states that

the Cu-Al-O extrudates can be shaped **with** or without **binding agent** or lubricant.

Examples 18-21 disclose Cu-Al-O catalysts in which graphite is added to the active material following production and before shaping; in example 22 a Cu-Al-O extrudate without binding agent is produced. Document D4 does not explicitly disclose a pore volume of more than 0.15 ml/g in the pore diameter range of 10 to 100 nm.

The applicant has submitted additional comparative tests, V2 and V3, in which extrudates, which can be produced by mixing the active material as per example 2 of the present application with graphite prior to extrusion, are compared with the claimed extrudates according to example 2.

The cutting hardness of comparative catalysts V2 and V3 is extremely low (<2 and ~2 [N] respectively; the cutting hardness is 20 [N] as per the inventive example 2) and the stability thereof is extremely poor. Extrudates V2 and V3 have a pore volume of 0.22 ml/g in the pore diameter range of 10 to 100 nm. No oxidic base material in particulate form can be detected in the comparative catalysts.

The subject matter of independent claim 1 thus differs from D4 in that the moulded catalyst body has the same oxidic base material in the active material and as binding agent and in that the

oxidic base material is present in the moulded body in a finely dispersed form and in particulate form.

The present invention can therefore be considered to address the technical problem of preparing moulded catalyst bodies with greater mechanical stability.

The subject matter of claim 1 solves that problem. There is nothing in the known prior art (e.g. D3 or D5) which could be used to solve the problem addressed by claim 1 and nor is the solution obvious from the prior art.

2.5 Claims 2-5 are dependent on claim 1; claims 6-9 concern the method of production and the use of the novel and inventive catalyst and therefore likewise meet the PCT requirements for novelty and inventive step.

An inventive step can therefore be acknowledged in respect of the subject matter of claims 1-9 (PCT Article 33(3)).

Box No. VII **Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

7.1 Contrary to PCT Rule 5.1(a)(ii), the description does not cite documents D1-D3 and D5 or indicate the relevant prior art disclosed therein.

7.2 Contrary to PCT Rule 5.1(a)(iii), the description is inconsistent with the amended claims.

Box No. VIII **Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The term "predominantly" in claim 4 has no generally recognised meaning and leaves the reader uncertain as to the meaning of the technical feature in question. As a result, the subject matter of said claim is not clearly defined (PCT Article 6).